

BROOKHAVEN NATIONAL LABORATORY

INTERAGENCY AGREEMENT

DRAFT

ANNUAL SCHEDULES UPDATE/REPORT

FOR

SITE REMOVAL AND REMEDIAL ACTIONS

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LIST OF ATTACHED SCHEDULES

Annual Schedules Update
Brookhaven Graphite Research Reactor (BGRR)
High Flux Beam Reactor (HFBR)
Land Use and Institutional Controls
g-2 Tritium Plume Remediation
Groundwater Status Report
Peconic River
Landfills
BNL Site Environmental Report

1.0 INTRODUCTION

Long Term Stewardship (LTS) activities under the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) are being conducted at Brookhaven National Laboratory (BNL) under an Interagency Agreement (IAG) among the U. S. Department of Energy (DOE), the United States Environmental Protection Agency Region II (EPA), and the New York State Department of Environmental Conservation (NYSDEC). The IAG is also referred to as the Federal Facility Agreement (FFA) under CERCLA Section 120 (Administrative Docket Number: II-CERCLA-FFA-00201). Subpart I under Section XVII of the FFA, Project Schedules and Deadlines, requires DOE to submit a revised schedule which will provide deadlines for draft primary documents and target dates for secondary documents for those Operable Units (OUs) scheduled to begin in the following two fiscal years. This document identifies the current schedule for each OU and Removal Action Area of Concern (AOC) identified to date, scheduled to be initiated or continued in Fiscal Year (FY) 2018 or FY 2019.

The BNL Response Strategy Document (RSD), January 1992, grouped the 24 then known AOCs into seven OUs and four Removal Actions. Details on the BNL site and the 24 AOCs comprising the removal and Remedial Actions (RAs) are documented in the BNL Site Baseline Report (SBR), January 1992.

Since then, several new AOCs have been added: AOC 25 (Building 479), AOC 26 (Building 208), AOC 27 (Building 464 Area Mercury Contaminated Soils), AOC 28 (Ethylene dibromide (EDB) Groundwater Contamination), AOC 29 (Spent Fuel Pool in High Flux Beam Reactor [HFBR] and Associated Groundwater Plume of Tritium), AOC 9D (Brookhaven Graphite Research Reactor [BGRR] Pile Fan Sump), AOC 16T (g-2), AOC 30 (Peconic River), AOC 31 (HFBR), and AOC 32 (Building 452 Freon-11 Plume).

In December 2013, in accordance with Section X.D of the FFA, EPA recommended to DOE that the Former Hazardous Waste Management Facility Perimeter Area be identified as either an AOC or Sub-AOC. As a result, the Perimeter Area has been included as Sub-Area of Concern 1J, and is included under the OU I Record of Decision (ROD). Additional details are provided in Section 3.2.

As agreed to by DOE, EPA and NYSDEC, any changes in OU structure (meaning the BNL Response Strategy) will be described in the Annual Schedules Update/Report as opposed to periodic updates to the RSD. The following reprioritization and restructuring of the OUs have been agreed upon by the IAG agencies:

- Radiologically contaminated soils from Operable Units I, II/VII and IV are addressed in the Operable Unit I Record of Decision (ROD) to ensure that all these soils are addressed in a consistent manner.
- Volatile Organic Compound (VOC) groundwater contamination on BNL property associated with the Current Landfill and Former Hazardous Waste Management Facility (FHWMF) is documented under the OU I ROD.

- Groundwater contamination outside BNL property associated with OU I AOCs and groundwater on BNL property associated with OU II/VII AOCs are addressed in the OU III ROD as part of a comprehensive approach to clean up contaminated groundwater. However, groundwater remediation associated with OU VI is distinct and is documented under the OU VI ROD.
- The Peconic River (AOC 30) was separated from the Record of Decision process from the Sewage Treatment Plant (AOC 4), Sewer Lines (AOC 21), and Eastern Off-site Tritium Plume (AOC 23). The ROD for the Sewage Treatment Plant, Sewer Lines and Eastern Off-site Tritium Plume was finalized in January 2002.
- The cleanup of Peconic River sediment on BNL property was performed under an Action Memorandum that was issued in January 2004 and was completed in September 2004. The sediment cleanup outside BNL property was performed under an Action Memorandum that was approved in September 2004, and the cleanup was completed in May 2005. The final Record of Decision for the Peconic River cleanup was finalized in January 2005.
- An area of radiologically contaminated soil along the eastern boundary of the FWHMF, AOC 1, was left in-place so that it could be used as a waste staging and railcar loading area (Waste Loading Area). The Waste Loading Area (WLA) was administratively transferred to the HFBR scope of work. The remediation of this area was performed as a non-time-critical removal action authorized by the *Action Memorandum, High Flux Beam Reactor, Removal Action for Waste Loading Area*, in October 2007. In February 2009, AOC 31, comprising the HFBR complex and the WLA was established. The cleanup of the WLA was completed and documented in *Final Completion Report, High Flux Beam Reactor, Area of Concern 31, Soil Remediation, July 2009*.
- Cleanup of the FWHMF Perimeter Area Phase I, II, and III soils were performed as a non-time-critical removal action authorized by the *Action Memorandum, Removal of Contaminated Soil from the Former Hazardous Waste Management Facility Perimeter Area* (June 2009). This area is included under the OU I ROD.
- BSA and DOE addressed the final remedy for AOC 12 (Eight USTs), AOC 16K (Aerial Radioactive Monitoring System Results, BLIP, Building 931B), and AOC 16T (G-2 source area and tritium groundwater plume) in one ROD that was finalized in May 2007.

The following changes to the RODs, as documented in ESDs, have been approved by the IAG agencies:

- 2005 OU III ESD - The change describes the final remedy selected for the Magothy aquifer, the changes proposed for the on-site cleanup of strontium-90 contaminated groundwater including additional time to meet the cleanup goals, and the resolution of no further action for the Building 96 geophysical anomalies,
- 2009 OU III ESD – The change describes the planned source area excavation and off-site disposal of VOC-contaminated soil at the former Building 96 area, which will also help

- optimize the existing groundwater pump and treat system,
- 2012 OU III ESD – The change describes the addition of one new extraction well, and the use of an existing extraction well to remediate the newly identified Freon-11 groundwater contamination, and the
- 2012 BGRR ESD – The change describes how the biological shield wall, which was originally intended to be removed to three feet below the BGRR floor level, was removed to floor level.

Table 1-1 lists the 32 BNL AOCs and 62 sub-AOCs. Table 1-2 lists the OUs and Removal Actions. This prioritization is a result of decisions made by DOE and BNL during the budget formulation and baseline update processes. The projects were reviewed based on evaluation criteria such as mission, environmental and human health risks, compliance/legal, social/cultural/economic, worker safety, and management experience and judgment. It is important to note that the priority ranking is dynamic and is subject to change based on many factors such as stakeholder involvement, characterization results, and changing liabilities.

Section 2 discusses the general scheduling aspects and assumptions, which were factored into the BNL/DOE proposed schedules. Section 3 presents the proposed schedules for the OUs and Removal Actions AOCs. Proposed schedule dates to conduct the planned work for each OU and Removal Action AOC have been identified. Milestones were developed for primary and secondary documents scheduled for submittal in FY 2018 and FY 2019. The scheduling of OUs and Removal Action AOCs are in accordance with the requirements outlined in the FFA, Part XVII, Subpart I.

The decommissioning of the BGRR was carried out as a remedial action under CERCLA. The BGRR ROD was finalized in March 2005. Remedial activities associated with the graphite pile removal project were completed in May 2010. Installation of the engineered cap and removal of the biological shield were completed in June 2011 and May 2012, respectively. An ESD to the BGRR ROD was issued in June 2012 and identifies the differences in the final remedy for removal of the biological shield. Implementation of the BGRR decommissioning project is now complete. The BGRR is currently in the surveillance and maintenance (S&M) mode. Responsibility for long-term stewardship of the BGRR S&M was transferred to the Lab's Environmental Protection Division (EPD) in July 2012.

The decommissioning of the HFBR is being carried out as a remedial action under CERCLA. The HFBR ROD was finalized in April 2009. The final remedy documented in the HFBR ROD incorporated many completed interim actions including the cleanup of the WLA; and removal and disposal of the control rod blades and beam plugs. The HFBR is currently in the S&M mode. Responsibility for long term stewardship of the HFBR building and HFBR grounds and stack was transferred to the Lab's EPD in November 2010 and May 2012, respectively. Removal of the HFBR stack will be completed by 2020 in accordance with the ROD. The ROD also requires the removal of the remaining structures, components, and confinement building within 65 years (by 2072) following the safe storage (decay) period.

Using American Recovery and Reinvestment Act (ARRA) funding (\$70.8 million), DOE and Brookhaven Science Associates (BSA) have accelerated a number of environmental cleanup projects, including the removal of the graphite pile and the biological shield from the BGRR and

the installation of the engineered cap and monitoring system, completion of several near-term actions associated with the decommissioning of the HFBR (dismantling of the remaining ancillary structures; removal of contaminated underground ducts and piping; and preparation of the confinement building for long-term safe storage up to 65 years), and the remediation of contaminated soils from the FHWMF Perimeter Area.

During remediation of the FWHMF Perimeter Area, additional areas of contamination were found in the vicinity. The characterization/remediation of some of these areas was completed in 2010 and was focused on the area slated to be used for the Long Island Solar Farm (LISF). The work was documented in the *Final Completion Report, Former Hazardous Waste Management Facility Perimeter Area Soil Remediation, April 2010*. Additional discrete areas of soil contamination within the Perimeter Area that were not previously addressed were investigated and remediated in September 2014, under the OUI ROD. The Addendum to the *Final Completion Report, Former Hazardous Waste Management Facility Perimeter Area Soil Remediation* was submitted to the regulators in February 2015 to document this last phase of the cleanup.

Starting in 2014 and continuing into 2016, demolition of the former Waste Concentration Facility (AOC 10) Buildings 810 and 811 was performed, as well as excavation of radiological contaminated soil and concrete. Additional details are provided in Section 3.2.

TABLE 1-1
Brookhaven National Laboratory
Areas Of Concern

AOC	Sub AOC	Title
1	1A 1B 1C 1D 1E 1F 1G 1H 1I 1J	Hazardous Waste Management Facility Open Burning/Detonation Area (SWMU 42) Spray Aeration Site Salvage Storage Areas (Boneyard) (SWMU 43) HWMF Fields (Boneyard) (SWMU 57) Drum Rinsing Area (SWMU 55) Radioactive material (Fission Product) Injection Site Miscellaneous Spill Sites Oil-Water Separator (SWMU 56) Neutralization Tank and Area (SWMU 4) Perimeter Area
2	2A 2B 2C 2D 2E 2F	Former Landfill Area Former Landfill (SWMU 58) Chemical/Animal Pits (SWMU 59) Glass Holes (SWMU 60) Interim Dump (SWMU 62) Slit Trench (SWMU 61) Ash Pit (SWMU 66)
3		Current Landfill (SWMU 48)
4	4A 4B 4C 4D 4E	Sewage Treatment Plant Sludge Drying Beds (SWMU 46) Sand Filters (SWMU 47) Imhoff Tank Sludge (SWMU 74) Holdup Ponds (SWMU 73) Satellite Disposal Area (SWMU 65)
5	5A 5B 5C 5D	Central Steam Facility 1977 Oil/Solvent Spill (SWMU 68) Former Leaching Pit (SWMU 69) Underground Piping (SWMU 81) CSF Fuel Unloading Areas (SWMUs 26-37)
6		Reclamation Facility Building 650 Sump
7		Paint Shop (Building 244) (SWMU 49)
8		Upland Recharge Area/Meadow Marsh (SWMU 88)

TABLE 1-1
Brookhaven National Laboratory
Areas Of Concern

AOC	Sub AOC	Title
9	9A 9B 9C 9D	Brookhaven Graphite Research Reactor Canal Underground Duct Work Spill Sites Pile Fan Sump
10	10A 10B 10C	Waste Concentration Facility (Building 811) Tank D-1, D-2, D-3 Underground Pipelines Six A/B USTs
11		Building 830 Pipe Leak (SWMU 91)
12		Underground Storage Tanks (Tanks 445 (1) and (2); 462, 463 (1) and (2); 527; 650 (1), (2), (3), and (4); 703; 830 (1) and (2); 927; and 931) (SWMU 77)
13		Cesspools (Buildings 51, T-122, 197, 244, 348, 422, 444, 449, 452, 555, 624, 902, 905, 914, 919, 919A, 919B, 926, 935, 940, 945, 945 (trailer), and 975) (SWMU 78)
14		Bubble Chamber Spill Areas (SWMU 75)
15	15A 15B	Supply/Potable Wells Potable/Supply Wells 1, 2, 3, 4, 6, 7, 10, 11, and 12 Monitoring Well 130-02
16	16A 16B 16C 16D 16E 16F 16G 16H 16I 16J 16K 16L 16M	Aerial Radioactive Monitoring System Results Alternating Gradient Synchrotron Storage Area Warehouse near Building 196 Warehouse Area, Space Effects Research Lab Magnets Accelerator Storage Field behind Medical Building Field behind Chemistry Building Field east of Brookhaven Center Decontamination and Hot Laundry South end of LINAC, Building 930 CLIF, Building 931A BLIP, Building 931B Peconic River Station M, flow Gate Measurement Device plus sedimentation due to bend in stream AD Beam Components Assembly Facility, Extraction Magnet Repair Facility Building 914

TABLE 1-1
Brookhaven National Laboratory
Areas Of Concern

AOC	Sub AOC	Title
	16N	Trailers north of Building 919A, Cryogenic Target Assembly Building, Service Area Adjacent to Gate 3 of Fast Beam Tunnel
	16O	Helium Systems Compressor Room, North Conjunction Area Used for Beam Pipe Modification, Building 919
	16P	On-Line Data Facility, Experimental Area Operations, Hot Magnet Storage Area, Building 912
	16Q	Trailers north and east of Building 912, Storage Area for Surplus Steel Shielding
	16R	Nuclear Waste Management Facility, Radioactive Waste Research Program and High-Intensity Rad Lab, Building 830
	16S	Contaminated Landscaping Soil (Including stockpiled soil adjacent to current landfill)
	16T	G-2 source area and tritium groundwater plume
17		Area Adjacent to Former Low-Mass Criticality Facility
18		AGS Scrapyard (Boneyard)
19		TCE Spill Area, Building T-111 (SWMU 79)
20		Particle Beam Dump, north end of Linear Accelerator (SWMU 76)
21		Leaking Sewer Pipes (SWMU 80)
22		Old Firehouse (Soil Remediation Project) (SWMU 92)
23		Off-site Tritium Plumes (southern and eastern)
24	24A 24B 24C 24D 24E 24F	Process Supply Wells 104 and 105 Process Supply Wells 104 and 105 Recharge Basin (Outfall 004) (SWMU 84) Recharge Basin HN, Outfall 002 (SWMU 82) Recharge Basin HO, Outfall 003 (SWMU 83) Recharge Basin HS, Outfall 005 (SWMU 85) New Storm water Runoff Recharge Basin (SWMU 87)
25		Building 479 (SWMU 50)
26	26A 26B	Warehouse Area Building 208 Former Scrapyard/Drum Storage Area South of Building 96
27		Building 464 Area Mercury Contaminated Soil
28		EDB Groundwater Contamination

TABLE 1-1 Brookhaven National Laboratory Areas Of Concern		
AOC	Sub AOC	Title
29		HFBR Spent Fuel Pool and Tritium Plume
30		Peconic River
31		HFBR
32		Building 452 Freon-11 Source Area and Groundwater Plume

SWMU – Solid Waste Management Unit

TABLE 1-2
Brookhaven National Laboratory
Priorities For Operable Units (OUs)/Removal Action AOCs
(Listed In Descending Order Of Relative Priority)

Category	AOC #	Description
Operable Unit V – Peconic River (ROD approved)	AOC 30	Peconic River – Cleanup on BNL Property Complete; Cleanup Outside BNL Property Complete; Supplemental Sediment Removal Complete 2011; Supplemental Sediment Removal at Area WC-06 Complete in 2017, Completion Report Under Review
Operable Unit II/VII (Addressed in OU I and g-2/BLIP/USTs RODs; Approved)	AOC 10A,B,C	Waste Concentration Facility (Building 811) – Complete (Building Removed 2015; Supplemental Soil Removal Complete in 2016; North Area Soil Strip to be Removed as Funding Becomes Available)
Operable Unit III Accelerated Action		Accelerated Groundwater Treatment Action (Volatile Organic Groundwater contamination near the southwest boundary) – Treatment System Operating
Operable Unit III Tritium Removal Action	AOC 29	HFBR Spent Fuel Pool and Tritium Plume – Treatment System was Shut Down and Placed on Standby 5/2013
Operable Unit III Off-site Removal		High VOC Concentration Portion of the Plume in the Industrial Park South of BNL– Treatment System was Shut Down and Placed on Standby 4/2013. System Temporarily Restarted 2014 through 2/2017 due to Elevated VOCs. New Treatment System Began Operation in Early 2015 to Capture Deep VOCs.
Operable Unit III (ROD Approved) Operable Unit III (ROD approved)	AOC 7	Paint Shop – Groundwater Monitoring Underway
	AOC 9	BGRR (groundwater) – Treatment System Operating
	AOC 10	Waste Concentration Facility (groundwater) – Treatment System Operating
	AOC 11	Building 830 Pipe Leak – Complete, Groundwater Monitoring Underway
	AOC 12	USTs – Complete for Building 830 1 and 2 Tanks
	AOC14	Bubble Chamber Spill Areas – Groundwater Monitoring Underway
	Sub AOC 15A	Supply/Potable Wells 1, 2, 3, 4, 6, 7, 10, 11, 12 – Groundwater Monitoring Underway
	Sub AOC 15B	Monitoring Well 130-02– Treatment System Operating
	AOC 18	AGS Scrapyard (groundwater) – Groundwater Monitoring Underway
	AOC 19	TCE Spill Area, Building T-111 – Groundwater Monitoring Underway

TABLE 1-2 Brookhaven National Laboratory Priorities For Operable Units (OUs)/Removal Action AOCs (Listed In Descending Order Of Relative Priority)		
Category	AOC #	Description
Operable Unit III (Continued) (ROD approved)	AOC 20	Particle Beam Dump, North End of Linear Accelerator (Includes Basin HT) – Monitor and Maintain per SPDES Permit and Natural Resource Management Plan
	AOC 21	Leaking Sewer Pipes (sitewide, not investigated under other OU study areas) – Groundwater Monitoring Underway
	AOC 22	Old Firehouse – No Further Action Per ROD
	Sub AOC 24A	Process Supply Wells 104 and 105 – Treatment Systems Operating, Groundwater Monitoring Underway
	Sub AOC 24B	Recharge Basin HP, Outfall 004 – Monitor and Maintain per SPDES Permit & Natural Resource Management Plan
	Sub AOC 24C	Recharge Basin HN, Outfall 002 – Monitor and Maintain per SPDES Permit & Natural Resource Management Plan
	AOC 25	Building 479 (groundwater) – Groundwater Monitoring Underway
	AOC 26A	Building 208 (groundwater) - Groundwater Monitoring Underway
	AOC 26B	Former Scrapyard/Drum Storage Area South of Building 96 – Treatment System Operating (Modification Completed); Soil Cleanup Completed
	AOC 27	Building 464 (groundwater) – Groundwater Monitoring Underway
	AOC 32	Building 452 Freon-11 Source Area and Groundwater Plume – Treatment System was Shut Down and Placed on Standby 3/2016
Operable Unit VI (ROD approved)	AOC 28	EDB Groundwater contamination – Treatment System Operating
g-2/BLIP/USTs (ROD Approved)	AOC 12	Underground Storage Tanks (for 8 USTs – Buildings 462 1 Tank, 463 1 and 2 Tanks, Building 527 1 Tank, Building 703 1 Tank, 927 1 Tank, and 931B 1 and 2 Tanks) - Complete
	AOC 16K	BLIP, Building 931B – Groundwater Monitoring Underway
	AOC 16T	G-2 Source Area and Tritium Groundwater Plume – Groundwater Monitoring Underway
HFBR (ROD Approved)	AOC 31	Waste Loading Area – Complete Control Rod Blades and Beam Plugs – Complete Building 801-811 Waste Transfer Lines – Complete HFBR Stabilization – Complete Fan Houses (Buildings 704 and 802) – Complete Underground Utilities – Complete

TABLE 1-2 Brookhaven National Laboratory Priorities For Operable Units (OUs)/Removal Action AOCs (Listed In Descending Order Of Relative Priority)		
Category	AOC #	Description
HFBR (Continued) (HFBR ROD Approved)		Stack Silencer – Complete Stack – To be Removed by 2020 Reactor Vessel & Components – To be Removed by 2072
BGRR (ROD Approved)	AOC 9	Graphite Pile – Complete
	AOC 9	Biological Shield – Complete; Closeout Report Approved
	AOC 9A	Engineered Cap – Complete; Closeout Report Approved; Surveillance and Maintenance Ongoing
	AOC 9A	Canal – Complete
	AOC 9B	Underground Duct Work – Complete
	AOC 9C	Spill Sites – Complete
	AOC 9D	Pile Fan Sump – Complete
Operable Unit I (ROD approved)	AOC 1	Hazardous Waste Management Facility - Complete
	AOC 2	Former Landfill Area – Cap Complete, Surveillance and Maintenance Ongoing
	AOC 3	Current Landfill – Cap Complete, Surveillance and Maintenance Ongoing
	AOC 6	Bldgs. 650 Sump and Sump Outfall – Complete
	AOC 8	Upland Recharge Area/Meadow Marsh – Complete
	AOC 12	USTs – Complete for Building 445 1 and 2 Tanks
	AOC 23	Off-site Tritium Plume (southern component) - Complete
	Sub AOC 24E	Recharge Basin HS, Outfall 005 – Complete
	Sub AOC 24F	New Stormwater Runoff Recharge Basin - Complete
	Sub AOC 1J	FHWMF Perimeter Area – Phase I, II, and III Complete
Operable Unit II/VII (Addressed in OU I and g-2/BLIP/USTs RODs: Approved)	AOC 16	Aerial Radioactive Monitoring System Results – Complete
	AOC 16R	Building 830 (Covered under AOC 11 and AOC 12) – Complete
	AOC 17	Area Adjacent to Former Low-Mass Criticality Facility – Complete
	AOC 18	AGS Scrapyard (Boneyard) – Complete
	AOC 20	Particle Beam Dump, North End of Linear Accelerator – Complete
Operable Unit IV (ROD approved)	AOC 5	Central Steam Facility – Treatment System Decommissioned
	AOC 6	Reclamation Facility Interim Action – Complete
	AOC 12	USTs – Complete for Building 650 1,2,3, and 4 Tanks
	AOC 21	Leaking Sewer Pipes (in study area) – Complete
	Sub AOC 24D	Recharge Basin HO, Outfall 003 – Complete
Operable Unit V - STP (ROD approved)	AOC 4	Sewage Treatment Plant – Complete
	AOC 21	Leaking Sewer Pipes (in the study area) - Complete

TABLE 1-2
Brookhaven National Laboratory
Priorities For Operable Units (OUs)/Removal Action AOCs
(Listed In Descending Order Of Relative Priority)

Category	AOC #	Description
(Continued) Operable Unit V – STP (ROD Approved)	AOC 23	Off-site Tritium Plume (eastern component) – Groundwater Monitoring Complete
Removal Action	AOC 1B	Spray Aeration Site – Complete
Removal Action	AOC 2 and 3	Landfills Closure – Complete
Removal Action	AOC 13	Cesspools – Complete
Removal Action	AOC 10A	Waste Concentration Facility – Tank D-1, D-2, and D-3 – Complete
Removal Action	AOC 12	Underground Storage Tanks - Complete
Removal Action	AOC 26	Building 208 – Complete
Removal Action	AOC 27	Building 464 Area Mercury Contaminated Soil – Complete
Removal Action	AOC 25	Building 479 – Complete
Removal Action	AOC 9D	Pile Fan Sump – Complete
Removal Action	AOC 30	Peconic River Sediment on BNL Property – Complete
Removal Action	AOC 1J	FHWMF Perimeter Area – Phase I, II, and III Complete

2.0 COMMON SCHEDULE CONSIDERATIONS

The proposed schedules were developed using the FFA and EPA Guidelines regarding RI/FS projects and removal or remedial actions. These schedules are based on a basic understanding of the amount of effort involved for each OU and Removal Action AOC. These proposed schedules may change or become more defined based on developments incurred during each effort. In addition, DOE will submit a revised schedule for RI/FS projects and remedial actions by November 30 of each year, which will provide deadlines for draft primary documents and target dates for secondary documents for those OUs scheduled to begin in the following two fiscal years.

2.1 DOCUMENT REVIEW

Document review involves both primary and secondary document considerations:

Primary Document Review

- BNL/DOE Internal Review/Revision
- 30-day EPA/NYSDEC Review of Draft
- 30-day DOE Submittal of Draft Final and written response
- After 30 days of re-submittal to EPA/NYSDEC, document becomes final (if there are no disputes)

Secondary Document Review

- BNL/DOE Internal Review/Revision
- 30-day EPA/NYSDEC Review of Draft
- 30-day DOE written response

The EPA, NYSDEC, and DOE can request 30-day extensions which, when approved, would automatically extend the various milestones.

2.2 RI/FS ACTIVITIES FOR OUs

All OUs currently identified have undergone the RI/FS process. The evaluation of remedial alternatives for the OU II/VII AOCs is included under the OU I FS. The proposed schedules for each OU to be initiated or to be continued in FY18 or FY19 include the initiation of work, the final schedules and deadlines for the submittal of draft primary documents, and the target dates for the submittal of the associated secondary documents (FFA Part XVII, Subpart I).

These FFA documents are as follows (FFA Part XV, Subparts C.2 & D.2):

Primary Documents

- RI/FS Work Plans, including the Sampling and Analysis Plans (SAPs);
- Remedial Investigation/Risk Assessment (RI/RA) Reports;
- Feasibility Study (FS) Reports;

- Proposed Remedial Action Plans;
- Records of Decision (ROD);
- Remedial Design (RD) Work Plans (if necessary);
- Remedial Action (RA) Work Plans (if necessary);

Secondary Documents

- Remedial Investigation (RI) SOW;
- Treatability Studies (if necessary);
- Preliminary RDs (if necessary);
- Closeout Reports (if necessary);

The RI/FS process involves:

- Initiation of Work: notify EPA & NYSDEC;
- Remedial Investigation SOW/secondary review;
- RI/FS Work Plan/primary review: includes SAP, Quality Assurance Program Plan (QAPP), and a Health & Safety Plan (HSP);
- Public Comment and Meeting and/or Poster Sessions;
- Remedial Investigation Field Work: notify EPA/NYSDEC 30 days in advance of sample collection; within 45 days of availability of Quality Assurance (QA) data, the QA data must be submitted to EPA (FFA Part XXIV, Subparts E & F);
- Remedial Investigation/Risk Assessment Report/primary review (FFA Part XII);
- Feasibility Study Report/primary review (FFA Part XIII);
- Treatability Studies (if necessary)/secondary review;
- Proposed Remedial Action Plan/primary review (FFA Part XIV);
- Public Comment (FFA Part XIV);
- DOE prepares Responsiveness Summary (FFA Part XIV);
- Record of Decision/primary review (FFA Part XIV): all AOCs will be documented in a ROD (FFA Part X, Subpart E.2g);
- Issue ROD to Administrative Record;
- ROD changes, as necessary.

If the ROD specifies that further remedial action is needed, then the Remedial Design/Remedial Action (RD/RA) effort will be implemented. In that case, DOE shall propose project schedules and deadlines for completion of the following draft primary documents within 30 days of issuance of any ROD (FFA Part XVII, Subparts L-N):

- Remedial Design Work Plan/primary review (FFA Part XIV);
- Remedial Action Work Plan/primary review (FFA Part XIV).

In addition, the following secondary documents will be prepared:

- Preliminary RD (if necessary)/secondary review;
- Closeout Report (if necessary)/secondary review.

2.3 REMOVAL ACTION ACTIVITIES FOR AOCs

Any Removal Action initiated or continued in FY18 or FY19 will have proposed schedules developed for the submittal of an Engineering Evaluation/Cost Analysis (EE/CA) for review and comment, for commencement of response action, and for submittal of the Completion Report.

The Removal Action process involves:

- Initiation of Work;
- Sampling and Analysis Plan (if necessary);
- Preliminary Field Investigation (if necessary);
- EE/CA for non-time critical removal actions;
- Public Comment;
- Action Memorandum: must be at EPA/NYSDEC no less than 45 days before Removal Action begins (FFA Part XI, Subpart B.3). All activities related to ongoing Removal Actions shall be reported by DOE in the progress reports as described in FFA Part XXI-Reporting (FFA Part XI, Subpart B.4);
- Initiate Removal Action;
- Completion Report/Closeout Reports: If EPA and NYSDEC determine that no further response action is necessary or that no response action will be necessary, EPA shall inform DOE in writing that no further response action is required for that particular AOC. The Completion Report on which the determination has been made shall be documented in a ROD (FFA Part X, Subpart E.2a).

2.4 NEPA INTEGRATION ACTIVITIES

It is DOE policy to integrate the procedural and documentation requirements of NEPA with CERCLA requirements. As recommended in the DOE Secretarial Policy on the National Environmental Policy Act, dated June 1994, the CERCLA process will address all NEPA concerns such as early public involvement in the CERCLA process, and an analysis of cumulative, off-site, ecological, and socioeconomic impacts to the extent practicable. As a result, an Environmental Assessment will not be conducted in addition to the FS Report or EE/CA.

2.5 OTHER FFA NON-SCHEDULED ACTIVITIES

In addition to the proposed schedule items covered in this report, project managers shall meet approximately every 60 days, except as otherwise agreed by the parties, to review and discuss the progress of work being performed at the site on the primary and secondary documents. Prior to preparing any draft document specified in FFA Part XV, Subparts C and D, the project managers shall meet to discuss the document contents in an effort to reach a common understanding, to the maximum extent practicable, with respect to the contents to be presented in the draft document (FFA Part XV, Subpart E).

For those primary documents or secondary documents that consist of or include Applicable or Relevant and Appropriate Requirement (ARAR) determinations, prior to the issuance of a draft document, the project managers shall meet to identify and propose, to the best of their ability, all potential ARARs pertinent to the document being addressed (Part XV, Subpart F). The FFA

specifies that ARAR identification is necessarily an iterative process and that potential ARARs must be re-examined throughout the RI/FS process until a ROD is issued.

Within 30 days of identification of additional OUs, DOE shall propose a deadline for submittal of the RI SOW and the RI Work Plan (FFA Part XVII, Subpart K).

2.6 ASSUMPTIONS

Specific assumptions have been made in order to develop the schedules given in Section 3:

- Secondary documents as noted in the schedules are prepared.
- Dispute Resolution (FFA Part XV, Subpart H) is not invoked.
- Fieldwork is not controlled by season.
- All laboratory analysis results are received by BNL within 90 days of sample collection.
- The Responsiveness Summary is not a separate document and will be included in the ROD.
- The DOE reviews encompass all appropriate branches (e.g., Brookhaven Site Office, HQ, etc.).
- The NEPA compliance activities will be conducted in accordance with Section 2.4 of this Report.
- Document review for primary and secondary documents will be in accordance with Section 2.2 of this Report.
- Activities in this document make certain assumptions regarding the allocations of funding from DOE. If full funding is not received, some activities may be delayed.
- If extensions are granted by the IAG agencies to increase the duration of the public comment period, all following activities will be appropriately extended.

3.0 SCHEDULES

The schedules presented here incorporate the applicable FFA schedule requirements, established EPA Guideline items, and the BNL workflow consideration (see Section 2.0 and 2.1). Section 3.1 shows the proposed schedules for the OUs and the Removal Action AOCs defined in Table 1-2, which will be initiated or continued in FY18 or FY19.

3.1 SCHEDULE FOR PROJECTS INITIATED OR CONTINUED IN FY18 OR FY19

Operable Units and Removal Action AOCs scheduled to be initiated or continued in FY18 or FY19, along with their associated deliverables and their proposed date in which they are due to the EPA and the NYSDEC for review, are attached.

3.2 STATUS OF PROJECTS SINCE PREVIOUS ANNUAL SCHEDULES UPDATE/REPORT

OPERABLE UNITS

Operable Unit I – The system remains shut down and in standby mode. Activities pertaining to the FHWMF Perimeter Area (Sub-Area of Concern 1J) and the Waste Concentration Facility demolition (AOC 10) are discussed below.

From November 2016 through February 2017, 11 temporary wells were installed to enhance the permanent well network and track the migration of Sr-90 from the former HWMF. The maximum Sr-90 concentration detected was 321 pCi/L, which is consistent with the previous high detection of 302 pCi/L in July 2015. The data from both the permanent and temporary wells show the Sr-90 to be slowly migrating to the southeast as expected. Groundwater monitoring will continue, followed by a comparison of monitoring data to model simulations in order to evaluate the accuracy of the simulations.

As a follow-up to the temporary wells previously installed, a monitoring well was installed in February 2017 to evaluate elevated volatile organic compounds (VOCs) persisting in this area downgradient of the Current Landfill and well 088-109. The maximum total volatile organic compounds (TVOCs) detected in 2017 was 9 µg/L. Data from this well will aid in the evaluation of the attenuation of these VOCs as they migrate south.

Operable Unit III – A summary of the changes made to these systems since November 2016 is as follows:

- **Middle Road**: The system continued operation with extraction wells RW-2, RW-3, and RW-7 operational, and RW-1, RW-4, RW-5, and RW-6 in standby mode.
- **South Boundary**: The system continued operation with extraction well EW-17 operational. In October 2017, extraction well EW-4 was placed in pulsed pumping mode (one month on and one month off). Extraction wells EW-3, EW-5, EW-6, EW-7, EW-8 and EW-12 remained in standby mode.
- **Western South Boundary**: Extraction well WSB-1 continued full time operation and WSB-2 remained in standby mode. From November 2016 through April 2017, 14 temporary wells were installed to complete definition of the width and extent of the on-site deeper VOC contamination. Four monitoring wells were also installed to enhance the permanent well

network. Beginning in September 2017, four additional temporary wells were installed along Carleton Drive in an east-west transect to characterize the off-site extent of VOC contamination. Maximum TVOCs detected in the four vertical profile wells were 32 µg/L at 145 feet below grade. The need for additional off-site characterization will be evaluated following update of the groundwater model with the recent data.

- Industrial Park: In February 2017, the in-well air stripping system extraction wells UVB-1 through UVB-7 were placed in standby mode. Extraction wells EW-8 and EW-9 continued operation to capture the deeper VOCs in this area. These wells are utilizing liquid phase carbon to treat the water rather than in-well air stripping.
- Industrial Park East: This system has been decommissioned. The facility, including the carbon vessels, controls, discharge piping, and injection wells are now being used to support remediation of the deeper Industrial Park VOC plume.
- North Street: The system remains shut down and in standby mode.
- North Street East: The system remains shut down and in standby mode. Ethylene dibromide (EDB) continued to be detected in one monitoring well above the standard. Following continued monitoring for EDB through the end of 2017, evaluate the need to restart extraction well NSE-1 and perform additional groundwater characterization.
- LIPA/Airport: The Airport extraction wells continued pulsed pumping, except for continued full time operation of wells RTW-1A, RTW-4A, and RTW-6A. Airport extraction well RTW-5A remained in standby mode. LIPA extraction wells EW-1L, EW-2L, and EW-3L remained in standby mode. Extraction well EW-4L was placed in standby mode in January 2017.
- HFBR Pump and Recharge: The system remains shut down and in standby mode.
- Building 96: Extraction well RTW-1 continued operation, and RTW-2, RTW-3, and RTW-4 remained in standby mode. Treatment for hexavalent chromium remained in standby mode since concentrations remained less than 50 µg/L. In July 2017, NYSDEC approved the renewal request for the Building 96 State Pollutant Discharge Elimination System Equivalency Permit, and the discontinuance of sampling for hexavalent chromium in the effluent of RTW-1. Treatment well RTW-1 continues to capture the downgradient low concentration portion of the Building 452 Freon-11 plume. A soil gas sample was obtained from soil gas monitoring well 085-359 in September 2017. Tetrachloroethylene was detected in the soil gas sample and follow up actions are being evaluated.
- Sr-90 Chemical Holes: Extraction well EW-1 continued pulsed pumping and extraction wells EW-2 and EW-3 remained in standby mode. A Petition for Shutdown of the system is being prepared for submittal to the regulators in late 2017.
- Sr-90 BGRR/WCF: The system continued operation with extraction wells SR-1, SR-2, SR-8, and SR-9 operational, and SR-6 was placed in standby mode in October 2017. Extraction wells SR-3 and SR-7 were placed in pulsed pumping mode in October 2017 due to low Sr-90 concentrations.
- Building 452 Freon-11: Following regulatory approval, the system was shut down and placed in stand-by mode in March 2016. The system was temporarily re-started from November 2016 through March 2017 due to a rebound in Freon-11 concentrations in EW-18. Since then, the system has remained shut down. Lower levels of Freon-11 are also being captured by Building 96 extraction well RTW-1.
- Following a request from NYSDEC, a one-time sampling event for 1,4-dioxane of 22 monitoring wells on and off of BNL property that have or had detected TCA was performed in January 2017. Sample results showed that 1,4-dioxane was detected in 17 of the 22

groundwater-monitoring wells sampled, at levels below the current NY State unspecified organic contaminant groundwater water standard of 50 µg/L.

Operable Unit V – The Final Plan for Optimization of the Peconic River Remedy, PR-WC-06 Area was submitted to the regulators in November 2016. A draft Work Plan and Quality Assurance Project Plan for sediment cleanup of Area WC-06 were submitted to the regulators for review in May 2017. Responses to regulatory comments and the revised Plans were submitted to the regulators in June 2017 for approval. The EPA, NYSDEC/NYSDOH, and SCDHS provided their concurrence in July 2017. In June and July 2017, respectively, NYSDEC approved the Permit Equivalency Application for the planned cleanup within the River, as well as the Application for Well-Point Dewatering. BSA's remediation contractor, LAND Remediation Inc., performed the sediment excavation of Area WC-06 under dry river conditions in mid-July 2017. Post-excavation confirmatory samples indicate that the cleanup goals for mercury were met. NYSDEC performed an inspection of the cleanup area in August 2017. Twenty-two waste super sacks were transferred to Building 865 in August 2017 for temporary indoor storage prior to final off-site disposal. The sediment is planned to be disposed of as low-level radioactive waste at Energy Solutions. The draft Completion Report will then be submitted to the regulators for review and approval.

Operable Unit VI - The system continued operation with both extraction wells operating.

BGRR – Surveillance and maintenance continued in 2017 and included quarterly inspections of the BGRR high-bay and former offices, and semi-annual inspections of the engineered cap and below ground ducts. The annual structural and roof inspection was performed in early November 2017 and there were no significant issues identified. Maintenance and repairs were performed throughout the year including the roof drain on the west air intake to protect against rainfall intrusion, and the flashing on the doghouse roof.

HFBR –Quarterly inspections of the facility (Bldg. 750) and grounds continued in 2017. In January, fire protection personnel performed their annual inspection and Facility Support performed a number of routine radiological surveys. The annual structural/roof inspection were completed in October 2017 and there were no significant issues identified. Maintenance and repairs to the HFBR were performed throughout the year including repair to the roof drain outside the building near the transformer room, maintenance of the aviation lights on the stack, pump-out of the stack drain tank, and collection and disposal of stack paint chips on the grounds. The annual stack structural inspection was performed in March 2017, and no new issues were identified.

Removal of the HFBR stack will be completed by 2020 in accordance with the final remedy in the ROD. A draft analysis of alternatives for demolition of the stack was submitted for BSA and BHSO review in October 2017.

The HFBR ROD also lays out a plan for the long-term segmentation, removal, and disposal of the remaining HFBR structures, systems, and components (including the reactor vessel and thermal and biological shields). These long-term actions will be conducted following a safe storage period (not to exceed 65 years) to allow for the natural reduction of high radiation levels to a point where conventional demolition techniques can be used to dismantle these reactor components.

Former FHWMF Perimeter Area – Since October 2005, several investigations of areas of radiologically contaminated soil surrounding the FHWMF, referred to herein as the FHWMF Perimeter Area, have been conducted to determine the nature and extent of contamination. These investigations identified radiological contamination along Brookhaven Avenue, within a contiguous area northeast of the FHWMF as well as several other discrete locations within wooded areas along the perimeter of the FHWMF boundaries. The contamination is believed to be a result of historical operations associated with the transfer and management of wastes to and within the FHWMF, deposition from incineration activities conducted at the FHWMF, and stormwater runoff from contaminated soils within the facility.

The cleanup of identified radiological contamination surrounding the FHWMF has occurred in three phases since being first identified in October 2005. The cleanup of Phase I (easily accessible, discrete areas of contamination found along the roadway and in the woods) was documented in the *Final Completion Report for the Former Hazardous Waste Management Facility Perimeter Area Soil Remediation* (April 2010). Phase II cleanup (an 11-acre section of the Long Island Solar Farm (LISF) Project area, located to the southeast of the FHWMF) was completed in 2010 and documented in the Addendum to the Former Hazardous Waste Management Facility Perimeter Area Completion Report. Both Phase I and Phase II projects were remediated to meet OU I cleanup goals and was performed as a non-time-critical removal action authorized by the *Action Memorandum, Removal of Contaminated Soil from the Former Hazardous Waste Management Facility Perimeter Area* (June 2009). Remedial activities were performed in accordance with *Closeout Procedures at National Priority Sites, OSWER Directive 9320.2-09A-P*.

Additional discrete areas of soil contamination within the FHWMF Perimeter Area that were not addressed in Phase I and II investigations were investigated and remediated in 2014. This effort, referred to as Phase III, was initiated with the submittal of the *Addendum to the Field Sampling Plan for the Former Hazardous Waste Management Facility Perimeter Area – Phase 3* (February 2014) to the regulators in March 2014. As requested by EPA, the Plan reflected the designation of the Perimeter Area as Sub-Area of Concern 1J and is now administratively included under the OU I ROD. The Phase III cleanup of approximately three acres was completed in 2014. The Addendum to the *Final Completion Report, Former Hazardous Waste Management Facility Perimeter Area Soil Remediation* was submitted to the regulators in February 2015 to document the radiological surveys, confirmatory sampling results, and independent verification performed in this last phase of the cleanup. Regulatory concurrence was provided in March 2015.

Waste Concentration Facility – A *Field Sampling Plan/Quality Assurance Project Plan, Waste Concentration Facility (AOC 10) and Surrounding Area* was issued as final to the regulators in August 2015. The Plan guided the collection and analysis of samples and data that were used to support the documentation of the remediation of contaminated soil and concrete foundations following the demolition of Buildings 810 and 811 at the former Waste Concentration Facility. Buildings 810 and 811 were demolished in June and August 2015 followed by excavation of the radiologically contaminated soil and removal of the waste transfer lines. The Final Status Survey was performed in May 2016 in accordance with the Quality Assurance Project Plan. Independent verification of the cleanup was performed in October 2016 by Oak Ridge Institute for Science and Education (ORISE), and the excavated area was backfilled and seeded. The regulators were

kept informed of remediation progress via monthly IAG teleconferences. The *Closeout Report Waste Concentration Facility (Bldg 811 – Area of Concern 10) and Surrounding Area* was submitted to the regulators for review in October 2016, and subsequently approved. An Addendum to the Closeout Report was issued to the regulators in January 2017 updating the volume of waste shipped and disposed of. An area of surficial-radiologically contaminated soil identified along the north fence line to the adjacent metal storage yard was placed under institutional controls, added to the Land Use and Institutional Controls (LUIC) contaminated soil map and will be remediated as funds become available in the future.

g-2 Tritium Plume/BLIP ROD – The annual BNL Environmental Monitoring Plan identifies the groundwater monitoring activities for the plume. The Quarterly and Annual Groundwater Status Reports present the groundwater monitoring results for the permanent and temporary wells installed. In February 2017, the annual g-2 and BLIP cap inspection certification letter was submitted to the regulators.

At the BLIP source area, tritium concentrations in groundwater have been less than the 20,000 pCi/L maximum contaminant level (MCL) since early 2006.

At the g-2 source area, tritium continues to be detected in semi-annual samples at concentrations above the MCL, with concentrations of less than 55,000 pCi/L since April 2012.

Land Use Controls – Over the past year, no activities have been observed at BNL that have impacted the protectiveness of the cleanup remedies. The institutional controls that were evaluated include adherence with procedures, reviews of fact sheets and maps that identify specific controls and restrictions, and field inspections to assess the effectiveness of institutional controls for each area. These controls are described and documented in an annual letter report that was issued to the regulators in February 2017. Starting in 2013, the annual letter report also included the g-2 and BLIP cap inspection, and a summary of the S&M activities and certification of the effectiveness of institutional controls at the BGRR and HFBR.

Five Year Review – The third site-wide Five Year Review Report was submitted to the regulators in June 2016, followed by briefings on the recommendations in July and August 2016. In August 2016, EPA provided concurrence with the protectiveness determination made by DOE in the Five Year Review. NYSDEC/NYSDOH, EPA, and SCDHS technical comments on the Report were provided in August and September 2016. The BNL Community Advisory Council was briefed on the progress of the Five Year Review. An Addendum to the Five Year Review that included responses to regulator comments was submitted to the regulators, approved, and issued as final in February 2017. A public notice was issued in Newsday in March 2017 to inform the community that the Five Year Review Report is available to the public at the information repositories and on the BNL website.

			IAG Schedule Update FY18												02-Oct-17 15:32																									
Activity ID	Activity Name	Start	2018												2019												2020													
			Oct	Nov	D	Jan	F	Mar	Apr	M	Jun	Jul	Aug	Sep	Oct	Nov	D	Jan	F	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov
Groundwater Status Report			♦ Draft 2017 Groundwater Status Report																																					
IAGA130	Draft 2017 Groundwater Status Report	15-Jun-18*																																						
IAGA140	Draft 2018 Groundwater Status Report	14-Jun-19*	♦ Draft 2018 Groundwater Status Report																																					
Peconic River																																								
IAGA150	Draft Peconic River Closeout Report	02-Feb-18*	♦ Draft Peconic River Closeout Report																																					
Landfills																																								
IAGA160	2017 Annual Landfills Report	15-Mar-18*	♦ 2017 Annual Landfills Report																																					
IAGA170	2018 Annual Landfills Report	15-Mar-19*																																						
BNL Site Environmental Report			2016 Site Environmental Report																																					
IAGA180	2016 Site Environmental Report	21-Sep-17 A																																						
IAGA190	2017 Site Environmental Report	01-Oct-18*																																					♦ 2017 Site Environmental Report	
IAGA200	2018 Site Environmental Report	01-Oct-19*																																						
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